WINDS.

The most frequent directions of the wind during October, 1888, are shown on chart ii by arrows flying with the wind. On the Atlantic coast from Virginia northward the prevailing winds were northwest; on the south Atlantic and Florida coasts they were variable; on the east Gulf coast, northerly, and on the west Gulf coast, southerly. In the lower lake region south to west winds were most frequently noted; in the Ohio Valley they were variable; in Tennessee, north to west; in the Mississippi Valley, variable. Along the southern slope of the Rocky Mountains the winds were mostly southerly; over the middle slope, westerly; and over the northern slope, northwesterly. In the plateau regions the winds were generally westerly, while on the Pacific coast they were west to south on the southern slope, north to west on the middle slope, and south to southwest on the northern slope.

HIGH WINDS (in miles per hour).

No maximum velocities of fifty miles, or more, per hour, other than those given in the table of miscellaneous meteorological data, have been reported, except at Fort Buford, Dak., 54, nw., 18th, and at Tatoosh Island, Wash., 54, nw., 23d.

LOCAL STORMS.

1st. *Ohio.*—Newark: a severe wind and rain storm occurred in the afternoon, doing much damage to buildings and trees.

2d. *Georgia.*—Columbus: Mr. W. S. Kennedy, of this place, makes the following report through Mr. H. M. Ayer: "October 2d, a disturbance of great grandeur and awful force was observed in the cloud regions; its effect at the earth's surface being noticeable only as tremulous and jarring sounds resulting from heavy electrical discharges. The only portion of the horizon obscured was directly under the formation, where a pillar of lead color was encompassed by a massive cloud-bank of great density; to the left of which were dark-brownish, drab clouds. Above these were gray, billowy, curled, crumpled clouds, which seemed to be continually curling and rolling themselves into each other, and pushing closer towards the cylindrical shaft, which contracted near the centre and opened out like a funnel at the top, as if impelled by some great centrifugal force. The velocity of the wind within the cylinder I judged to be terrific. The height above ground of the disturbance was about 45°, and the distance from my point of observation one mile or more. The pillar assumed the hour-glass contraction, and seemed to tend upwards instead of downwards, as the opposing currents of air seemed to strike near the bottom of the formation, blend, and assume the twirl of an auger, and push for the contraction and towards the top. The motion of the pillar was something like the action of a balloon, ever upwards, and swaying from side to side. At times it seemed as if completely suspended and to lose its motion. What I should call the tail was composed of lights which streamed straight out for miles to the southward. A few drops of rain fell before and but little afterwards. The day opened clear and bright; towards noon the sky was hazy, and a heaviness and humidity was observable; about 3 p. m. clouds were seen congregating and drifting from northeast to west; about 3.30 p. m. (ninetieth meridian time) they were seen to assemble in the northwest and drift to west, being impelled by a brisk wind, and gaining momentum as they approached the place where they concentrated and formed the phenomenon above described. The formation was dispelled by a loud burst of thunder." *Ohio.*—Cedarville: a severe wind storm occurred about 5 p. m., unroofing buildings, blowing down trees, &c.

19th. *Maryland.*—Utica Mills: Mr. G. F. Mills reports: "This section was visited by a violent tornado, doing considerable damage eight miles south of this place; it unroofed houses, uprooted trees, and blew down fences. Direction of movement was from west to east; width of path of greatest destruction, 1,500 yards; width of storm twelve miles; rain commenced 6.05 p. m. and ended 6.20 p. m.; total fall, .50 inch. The storm was attended by electrical manifestations." *New York.*—Middletown: a destructive wind and rain storm, accompanied by vivid lightning, passed over this section about 5.45 p. m.; fencing, trees, and crops were much injured.

22d. *Louisiana.*—Whitney Plantation, Saint John Baptist Parish: Mr. G. H. Tassin reports: "At 4.35 a. m., New Orleans time, a storm swept the whole depth of this plantation (two miles), which is about fifty miles above New Orleans. It moved from south to northeast, and, on striking the Mississippi levee, ascended, and again struck the ground on the other side of the river. This was a very powerful and destructive disturbance, and although the width of the path did not appear to be over three hundred feet, two persons were probably fatally injured; two mules were killed by flying splinters, and out-buildings were demolished. No rain had fallen for thirty-two days previous to the storm, and during the week preceding it the weather had been very warm, the thermometer reaching 86° at 11 p. m. for three consecutive days. After the passage of the storm we had quite a severe hail storm, but the hail did not fall to the west of the path. Directly after the hail, rain poured down in heavy drops for twenty minutes, then it ceased to start again and continued to fall very heavily for about an hour. The storm kept almost all the débris within its path, more particularly on the west side, and it is not known what became of all the lumber that made up the buildings destoyed. Our loss, comprising stock, buildings, and hay crop, is not less than $3,000. The path of this storm was almost parallel with, and about five hundred feet distant from, that of the terrible storm of November 22, 1884."

WATER-SPOUTS.

Captain J. McFarlin, of the s. s. "Stroma," observed a water-spout October 7th, 4 p. m., in N. 39°, W. 68°, traveling from wnw. to ese., with wind from sse., force 8. Captain McIntosh, of the ship "Steinvora," reports a water-spout October 14th, 5 p. m., in N. 39°, W. 71°, moving slowly se., with wind nw. hauling to ne., and increasing from force 2 to force 7, and barometer steady. On the same day, at 5 p. m., Captain Blake, of the schr. "Cox and Green," observed a water-spout about twenty miles off Fire Island, moving sw., wind calm before, and ne. force 6 after, its appearance. Captain A. McKay, of the s. s. "Pavonia," reports a water-spout October 19th, 11.30 a. m., in N. 51°, W. 10°, moving w., with slowly rising barometer, and wind sse., force 6. Captain Chambers, of the brig "Bessie May," observed a water-spout October 22d, 2 p. m., in N. 32°, W. 74°, moving s., with wind ne., force 4. The captain of the s. s. "Aguan," reports a water-spout October 25th, 10.30 a. m., in N. 19°, W. 76°, moving wsw., with wind e., force 4.

Captain Legoe, of the s. s. "Pomona," reports water-spouts as follows: "October 16th, 6.15 a. m., Cape Morant Point, Jamaica, sw., eighty miles, saw a very large water-spout, traveling rapidly toward the wsw., about one-fourth of a mile from the ship. October 20th, 5 p. m., in N. 33° 47′, W. 74° 49′, saw a water-spout bearing nw., going to the ne., wind sw., squalls, with lightning and light rain; at 10 p. m. wind came out of nw. in heavy squalls."

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

Toledo, Ohio: 1st, during the high southwesterly wind in the morning, the water in the Maumee River fell rapidly, and many vessels were aground.

Nashville, Tenn.: navigation on the upper and lower Cumberland River is now practicable; the first large steamer made a trip up the river, and two large boats, the first ones of the season, came up from the Ohio River on the 23d.

Saint Paul, Minn.: the steamer "Mary Morton," from Saint Louis, Mo., arrived here and departed on the 26th. She is reported to be the last boat of the season.

In the following table are shown the danger-points at the various stations; the highest and lowest depths for October, 1888, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, October, 1888 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La.....	29.9	1	6.3	31	1.0	5.3
Arkansas River:						
Fort Smith, Ark ...	22.0	1	1.7	19-21 and 25-27	1.1	0.6
Little Rock, Ark...	23.0	1	2.4	19, 23	1.4	1.0
Missouri River:						
Leavenw'rth, Kans.	20.0	1	6.6	31	5.5	1.1
Kansas City, Mo...	21.0	1	6.6	31	6.0	0.6
Mississippi River:						
Saint Paul, Minn...	14.5	30, 31	3.6	1	2.9	0.7
La Crosse, Wis	24.0	30, 31	3.8	11	3.3	0.5
Dubuque, Iowa	16.0	1, 2	3.4	14, 15	2.9	0.5
Davenport, Iowa...	15.0	22	2.2	8, 14	1.8	0.4
Keokuk, Iowa	14.0	1, 23, 24	1.8	13, 18	1.2	0.6
Saint Louis, Mo ...	32.0	1	6.0	18	5.0	1.0
Cairo, Ill	40.0	31	18.6	13, 16	5.0	13.6
Memphis, Tenn....	34.0	31	12.2	18, 19	4.8	7.4
Vicksburg, Miss*..	41.0	1	13.7	25	2.4	11.3
New Orleans, La ..	13.0	1	4.5	17-22 and 28-31	3.3	1.2
Ohio River:						
Pittsburgh, Pa.....	22.0	21	11.3	1	4.4	6.9
Parkersburg, W.Va.	38.0	20	16.0	1	3.7	12.3
Cincinnati, Ohio ...	50.0	30	33.0	5	6.9	26.1
Louisville, Ky.....	25.0	31	11.8	10	4.3	7.5
Cumberland River:						
Nashville, Tenn ...	40.0	31	16.0	13	1.4	14.6
Tennessee River:						
Chattanooga, Tenn .	33.0	28	20.0	8	2.8	17.2
Monongahela River:						
Pittsburgh, Pa.....	29.0	21	11.3	1	4.4	6.9
Savannah River:						
Augusta, Ga	32.0	27	20.9	23	7.9	13.0
Willamette River:						
Portland, Oregon ..	15.0	6	3.4	1	0.9	2.5

*For 25 days.

FLOODS.

Saint Paul, Minn., 5th: reports from Ramsey Co., Dak., state that the recent freshets have destroyed nearly all of the wheat crop in that county, and that, as a consequence, the inhabitants are in a destitute condition.

Bangor, Me., 8th: heavy rains since the 5th instant have caused freshets in this section. Oldtown, Penobscott Co., Me., 8th: heavy rains have caused the Kennebec River to rise, doing much damage to property and the lumber interests.

Calais, Washington Co., Me., 9th: the Saint Croix and Aroostook rivers are nearly at their high water marks; lumber mills and factories are being closed; timber is being carried away by the floods; railroads washed out, and crops damaged or ruined. Fairfield, Somerset Co., Me., 9th; great freshets prevail in this vicinity, causing much damage to mill property.

Saint John's, N. B., 10th: trains on the New Brunswick Railroad were delayed on the 8th by washouts resulting from the recent heavy rains. Reports from Fredericton state that four bridges crossing the Nashwaak River were swept away yesterday, together with 1,000,000 feet of logs. The water has caused great destruction to the hay and buckwheat crops in Queens and Carleton counties; barns were swept away and a number of saw mills flooded.

Los Angeles, Cal.: the following are extracts from the Los Angeles "Daily Herald" of October 19th and 20th, 1888: "A cloud burst of extraordinary violence is reported on the desert along the line of the Southern Pacific Railroad. The rain came down in a perfect torrent on the night of the 18th, causing big washouts between Gila Bend and Texas Hill, Ariz., and numerous, though not very large washouts, between Cactus and Salton, Cal. The water fell in almost a solid mass at times, over two inches being registered at one place inside of an hour."

HIGH TIDES.

Eastport, Me., 7th to 9th. Cedar Keys, Fla., 10th: on this date a storm of marked energy was central over the eastern part of the Gulf of Mexico. At 9.30 p. m. the wind veered from easterly to south, and the barometer stood at 29.22 (lowest during storm). At this hour the water was at low water mark, and by 10 p. m. had risen over nine feet, covering the streets in the lower part of the town, and floating off three large rafts of logs. Many people fled from their homes and were obliged to wade waist deep in water. No lives were lost, although a number of narrow escapes were reported. Total damage in the vicinity estimated at $5,000.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays were most freqently noted at stations in eastern Massachusetts, where they were observed on nine dates. They were observed south of the fortieth parallel on three dates, *i. e.*, in the Ohio Valley on the 1st and 30th, and in northwestern Kansas on the 31st. The most noteworthy display, which was observed from eastern New England to the upper Missouri valley and southward to the thirty-eighth parallel, occurred on the nights of the 30th and 31st. The passage of a storm-centre from Manitoba over the upper lake region during these dates occasioned more or less cloudiness over the northern part of the country, which doubtless prevented the display from being more generally observed.

At Saint Vincent, Minn., the northern sky was obscured until 11.30 p. m. of the 30th, when an aurora became visible, first as a faint, broad arch, which increased in brilliancy until 1.20 a. m. of the 31st. At this time its altitude was about 15° and azimuth 105°. The display continued until morning, and appeared as a faint auroral light at 8 p. m., 31st. At 9 p. m. the sky became obscured.

Huron, Dak.: an aurora was observed in the north from 10.30 p. m., 30th, until daybreak the following morning; the display, though faint, was very bright at times.

Grand Haven, Mich.: a faint aurora began 10.30 p. m., 30th, which extended from 135° to 260° of azimuth, and rose to a uniform altitude of 15°. Its light was nearly white and quite steady. There were no waves or flashes of light. It increased in brilliancy until 10.50 p. m., when it was almost obscured by a bank of cumulo-stratus clouds until 11.20 p. m., after which it gradually faded until it disappeared at 11.45 p. m.

Fort Buford, Dak.: an aurora was observed on the 11th; it was first observed at 11.55 p. m., and then consisted of streamers rising apparently from a dark base to an extreme height of about 60°. Owing to clouds in the northern sky the aurora could not be well observed. At 12.58 a. m., 12th, the sky began to clear and the aurora was then in the form of a well-defined arch, with a maximum altitude of about 30°, and of straw and white color. It extended from northwest to northeast, and rested on a well-defined dark base. It disappeared 2.10 a. m., 12th.

Auroras were observed during the month as follows: 1st, Olney, Ill.; Saint Vincent, Minn. 4th, Milton, Mass.; Saint Vincent, Minn. 10th, Gardiner and Orono, Me.; Newburyport, Mass.; Fort Assinaboine, Mont.; Plymouth, N. H. 11th, Huron, Dak.; East Berksbire, Gardiner, Mayfield, and Orono, Me.; Cambridge and Newburyport, Mass.; Nashua, N. H.; Lyons, N. Y. 15-16th, Milton, Mass. 19th, Pekin, Ill.; Milton, Mass. 21st, Saint Vincent, Minn.; South Canisteo, N. Y. 25-26th, Milton, Mass. 29th, Delavan, Wis. 30th, Huron, Kimball, and Webster, Dak.; Belvidere, Cedarville, Lake Forest, Oneida, Oswego, Riley, and Winnebago, Ill.; Butlerville, Ind.; Maquoketa and Osage, Iowa; Kent's Hill and Orono, Me.; Blue Hill Observatory, Cambridge, Fitchburg, Groton, Leicester, Milton, Newburyport, and Provincetown,